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ABSTRACT

This survey was designed to examine how National Science Foundation's (NSF) International Travel Grant Program might be revised to better meet international travel needs of faculty in American universities. The survey results provide information about the extent of participation in international scientific meetings and the sources of travel support. The survey also provides insight into department heads' perceptions of the professional benefits derived from attending such meetings. (Author/JN)

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An Analysis of Travel by Academic Scientists and Engineers to International Scientific Meetings in 1979-80

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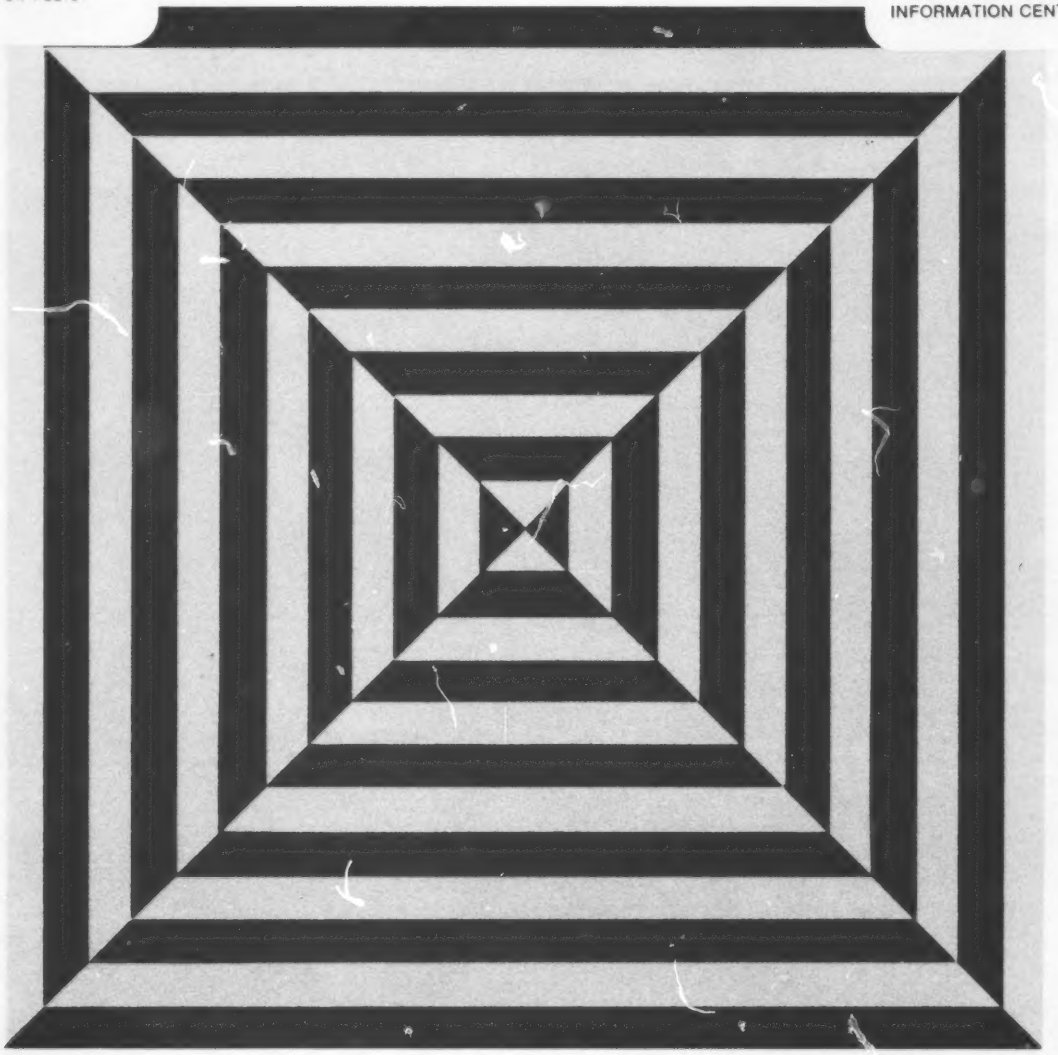

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AMERICAN COUNCIL ON EDUCATION

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An Analysis of Travel by Academic Scientists and Engineers to International Scientific Meetings in 1979-80

Frank J. Atelsek
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Special gratitude goes to the HEP campus representatives and the 814 department heads who responded to the survey.

Background

The National Science Foundation is an important source of support for travel to international scientific meetings by academic scientists and engineers. This survey was designed to examine how NSF's International Travel Grant Program might be revised to better meet international travel needs of faculty in American universities. The survey results provide information about the extent of participation in international scientific meetings and the sources of travel support. The survey also provides insight into department heads' perceptions of the professional benefits derived from attending such meetings.

Methods Summary

The Higher Education Panel is a continuing survey research program created in 1971 by the American Council on Education to conduct specialized surveys on topics of current policy interest to the higher education community and government agencies.

The Panel is a stratified sample of 760 colleges and universities drawn from the population of more than 3,000 higher education institutions listed in the National Center for Education Statistics' Education Directory. All institutions in this population are grouped in terms of the variables constituting the Panel's stratification design, which is based primarily on type (university, four-year college, two-year college), control (public, private), and size (full-time-equivalent enrollment). For any given survey, either the entire Panel or an appropriate subgroup may be used.

The present survey (see Appendix A) was mailed on May 2, 1980, to the 181 public and private universities within the Higher Education Panel. Two of the surveyed institutions were subsequently dropped (one had none of the applicable science and

engineering departments, and the other was not structured along departmental lines), thereby reducing the group surveyed to 179 universities. Usable responses were received from 166, or 93 percent of the institutions surveyed.

The questionnaire was directed to department heads in six science and engineering fields. If there was no general biology department, the largest other life science department was asked to respond.

Data from responding universities were statistically adjusted to represent the entire eligible population of 184 universities and their 1,002 applicable science and engineering departments.

Thus, the data from this survey represent the following six fields at public and private universities:

Types of Departments	Number
Biology (or other life sciences)	183
Chemistry	182
Mathematics	184
Physics	182
Electrical engineering	135
Mechanical engineering	136

Appendix B presents the stratification design for weighting the survey responses to national estimates, as well as a comparison of respondents and nonrespondents.

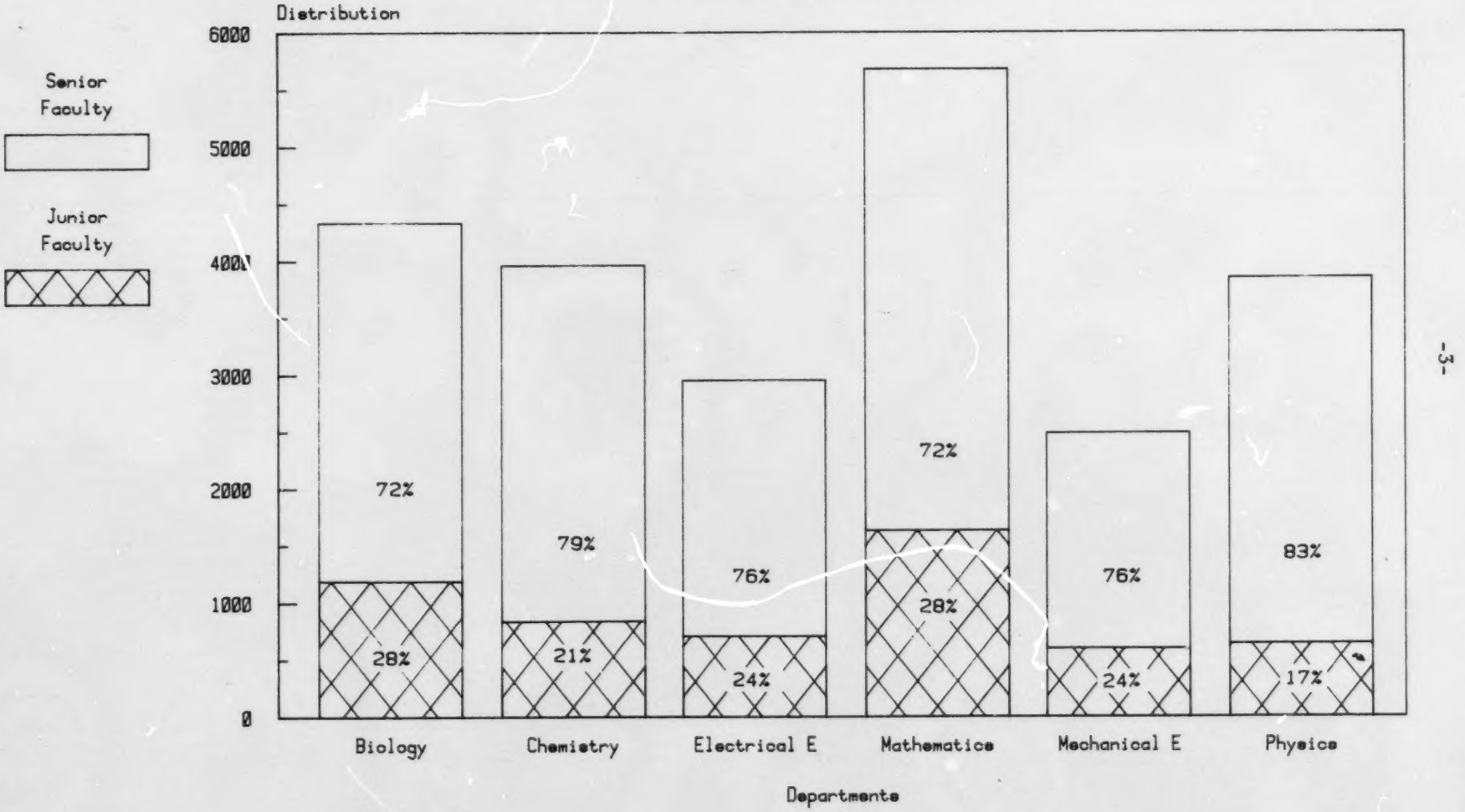
Findings

Extent of Faculty Participation

The six selected science and engineering departments at the 184 public and private universities included in this survey had a 1979-80 academic year complement of nearly 23,300 full-time faculty members, three-fourths of whom were designated as senior faculty (table 1). Figure 1 shows how the faculty was distributed among the six fields covered in the survey. It also shows the proportion of junior and senior faculty in each type of department.

Fig. 1. Distribution of Full-Time Faculty

All Universities, 1979-80



Although the data are not exactly comparable to those collected in our earlier surveys[1], there does appear to be a consistency among different surveys of faculty composition. Physics, for example, continues to show below-average representation of junior faculty members; mathematics continues to show an above-average representation.[2]

During the 1979-80 academic year, the faculty members covered by the survey made a total of 4,800 trips abroad to attend international scientific meetings. On average, for every 100 of their number the full-time senior faculty made 23 trips. The corresponding number for junior faculty was 13 trips. Figure 2 shows this greater rate of travel for senior faculty holds without exception for all fields included in the survey. In general, both the junior and senior faculty at private universities reported somewhat more travel to such meetings than did their counterparts at public universities.

Among the six types of departments covered in the survey, electrical engineering faculty were the most frequent travelers to international scientific meetings (26 trips per 100 faculty) and the mathematics faculty the least frequent travelers (15 trips per 100 faculty).

Another perspective on the extent of travel is provided in figure 3, which shows average trips per department. Overall, 4.9 person-trips was the average during 1979-80. Junior faculty accounted for 15 percent of departmental travel or .8 trips per department. In short, junior faculty made less than one-sixth of the trips but comprised

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[1]The present survey is confined to public and private universities and the previous studies covered all Ph.D.-granting institutions.

[2]Frank J. Atelsek and Irene L. Gomberg, Young Doctoral Faculty in Science and Engineering: Trends in Composition and Research Activity, Higher Education Panel Report No. 43, February 1979.

Frank J. Atelsek and Irene L. Gomberg, Young Doctorate Faculty in Selected Science and Engineering Departments, 1975 to 1980, Higher Education Panel Report No. 30, August 1976.

Fig. 2. Number of Person-Trips per 100 Full-Time Faculty

All Universities, 1979-80

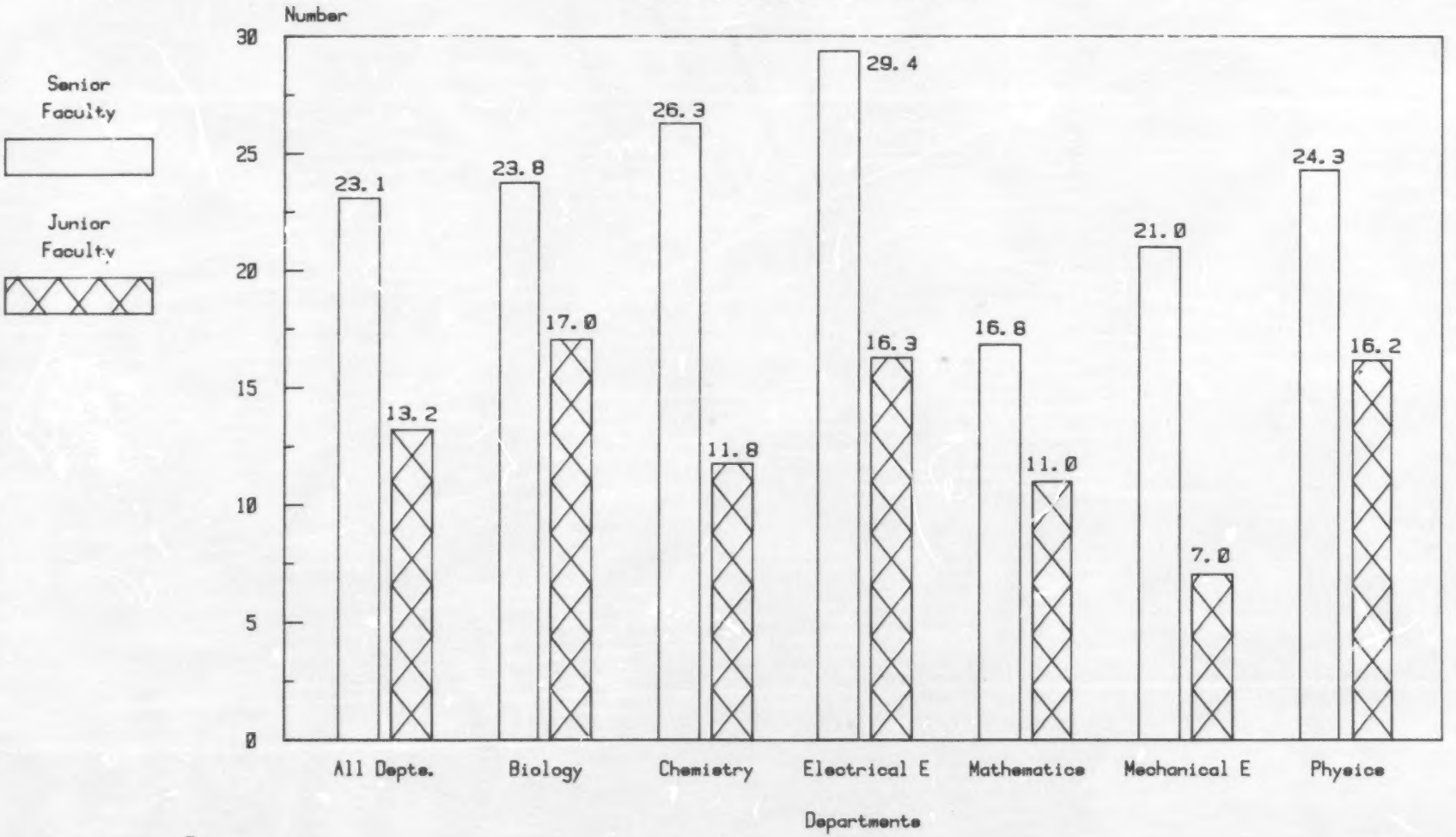
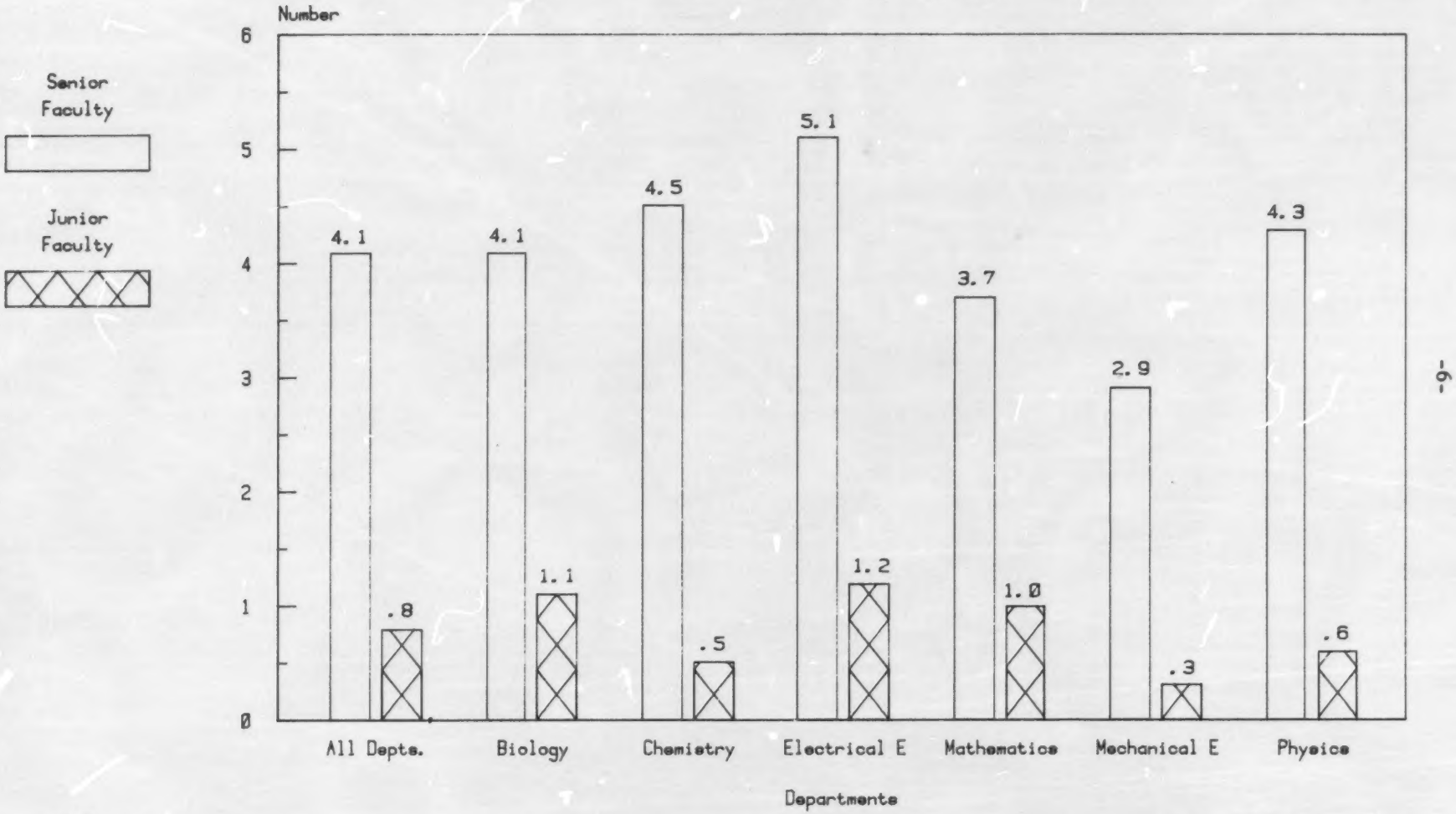


Fig. 3. Number of Person-Trips per Department

All Universities, 1979-80



almost one-fourth of the faculty in these departments. Figure 3 also shows that the split between junior and senior travel was much greater in some fields than in others. For example, junior faculty members in mathematics and biology made more than one-fourth of the trips whereas in chemistry and mechanical engineering they accounted for only about one-tenth of such international travel.

Expenditures and Sources of Funds

Department heads were asked to approximate the total dollars expended within their departments during the academic year (1979-80) for attendance at international scientific meetings. It was estimated that these expenditures totaled $5.8 million at the 184 universities represented in the survey. As shown in figure 4, the funds expended for these purposes during that academic year averaged about $1,200 per person-trip.

Among the six types of departments covered in the survey, average expenditures per person-trip were highest for electrical engineering departments at private universities ($1,610) and lowest among the mathematics departments, also at private universities ($659).

Figure 5 profiles these travel expenditures according to their source. Overall, the travel expenditures were supported by the following sources:

	Percentage
Federal	49
Institutional	17
Personal	12
Other	22

Figure 5 shows several substantially divergent distributions of funding sources among the six types of departments. (See also table 2.) Physics departments, for example, drew an above-average proportion of their funds from federal sources (about 60 percent) and a lower-than-average proportion from personal and other funds. In contrast, the mathematics departments were below-average users of federal funds (34 percent) and above-average in the use of personal funds (27 percent).

Fig. 4. Average Cost per Person-Trip

All Univereities. 1979-80

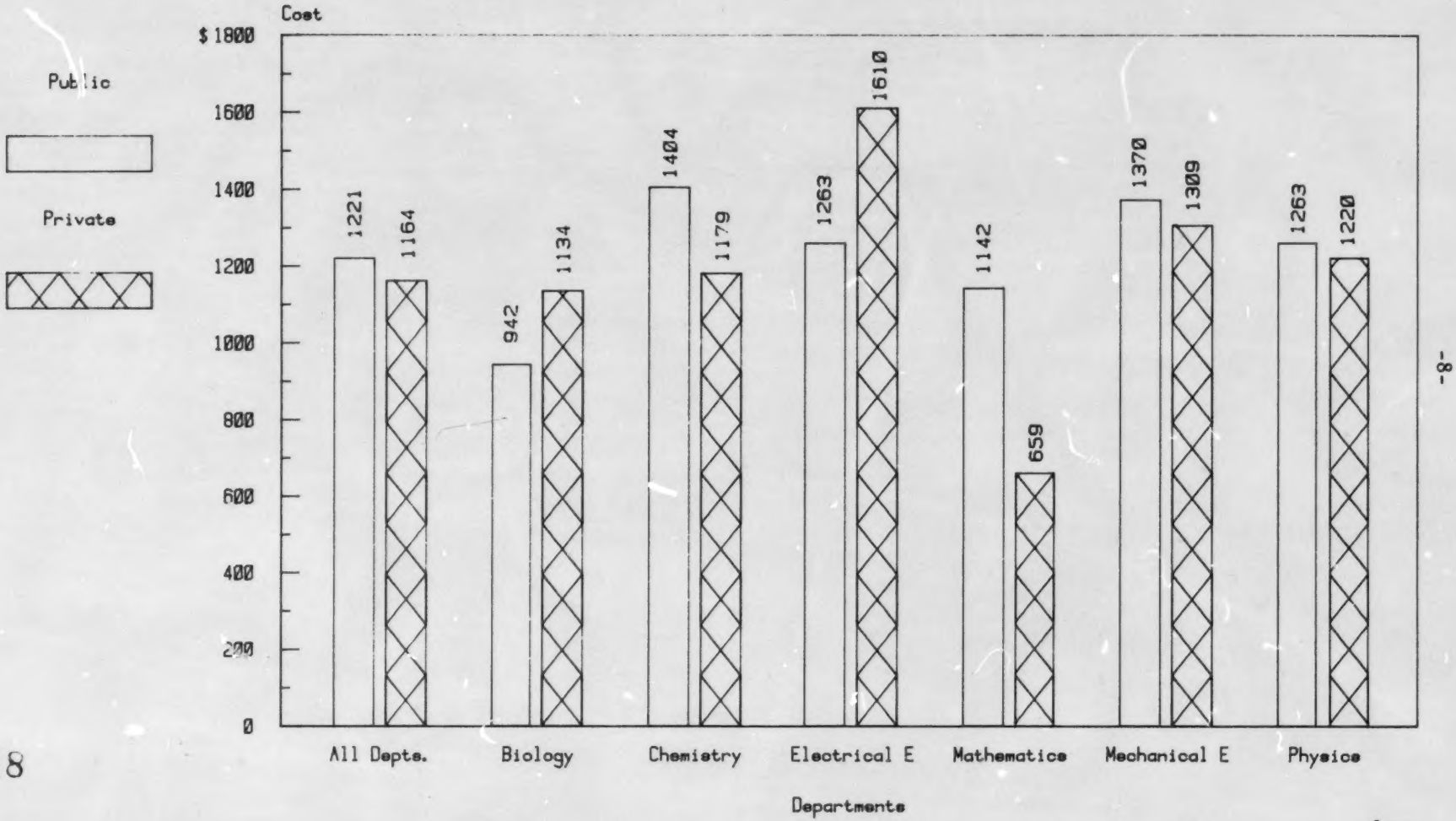
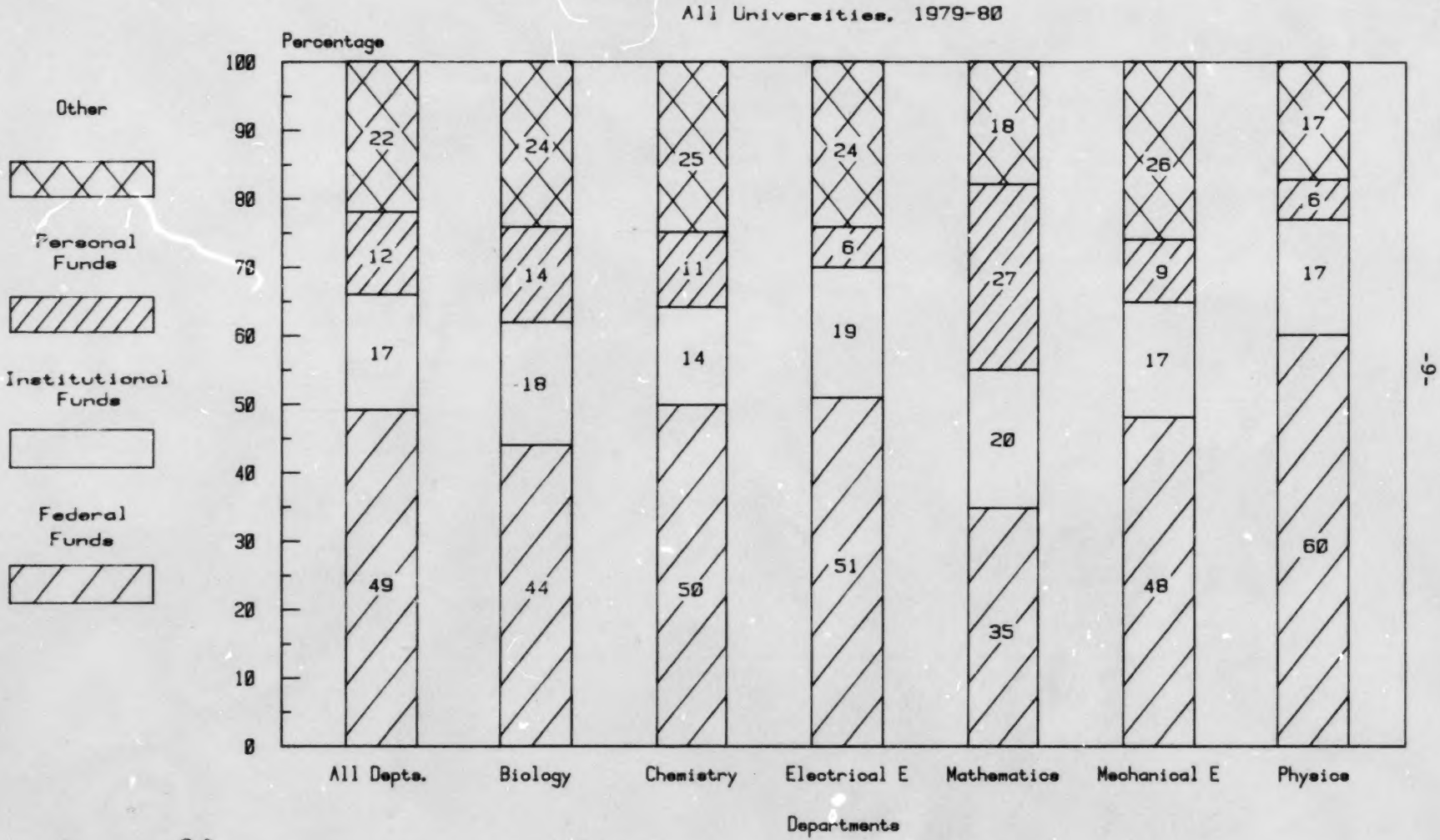


Fig. 5. Percentage Distribution of International Travel Expenditures, by Source of Funds



Opinions about Federal Funding

The survey also asked the department heads' opinions about the adequacy and mix of federal funding in their disciplines for travel to international scientific meetings. Table A (abstracted from table 3) summarizes the responses to this query. Overall, 57 percent of the department heads thought the level of federal funding was adequate. Thirty percent, however, expressed reservations about the mix of faculty recipients, even though total funding was believed adequate. Most of these believed more opportunities for participation should be given to the younger scientists.

Table A
Views of All Department Heads of
Adequacy of Federal Support for International Travel

Level of Federal Support	Responses (percent)
Support is adequate:	57
Good mix of younger and established scientists	(27)
More opportunities should be given to younger scientists	(24)
More opportunities should be given to established scientists	(6)
Support is inadequate: more funds are needed even if at the expense of research	20
Support is too high: some funds should be reallocated to research	2
Other comments	17
Do not know	4
Total	100

About one-fifth of the department heads were dissatisfied with the level of federal support for travel to international meetings, but only a few (2 percent) thought there was too much support and that some funds should be reallocated to research.

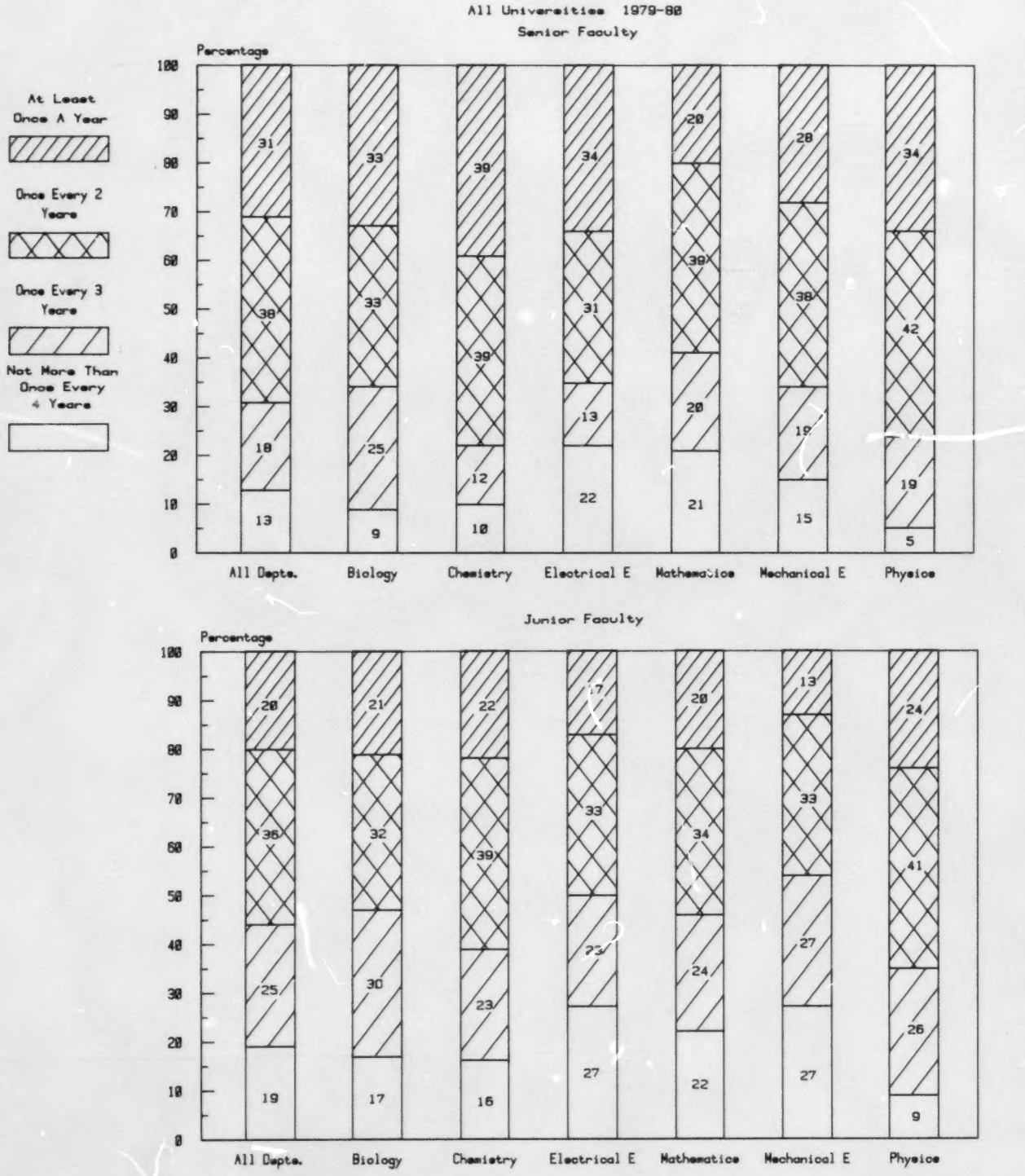
Almost all of the dissatisfied group contended that federal support was so inadequate that more funds should be made available even if at the expense of research funding.

Optimal Frequency of Travel

In addition to the data about actual attendance, department heads were also asked their opinions about optimal participation of their junior and senior faculty at international scientific meetings from the standpoint of gain to the department and the faculty. Figure 6 summarizes their assessments. In general, they viewed frequent attendance (at least once a year) as more important for senior faculty than for junior faculty (31 percent and 20 percent respectively). As the figure also shows, however, a substantial proportion of department heads thought that attendance should be relatively infrequent. Forty-four percent thought attendance not more than once every three years was ample for junior faculty. For senior faculty the same limitation was endorsed by 31 percent of the department heads. (See also table 4).

Views about optimal attendance varied considerably among the six fields covered in the survey. The patterns of differences closely followed each field's report of actual travel, although the optimums expressed were consistently higher than actual average attendance. Relatively frequent attendance for senior faculty was consistently viewed as more important by department heads in each field although the optimums also differed considerably. In chemistry, for example, almost two-fifths of the department heads thought that senior faculty should attend international scientific meetings at least once a year. In mathematics, however, only one-fifth of the department heads endorsed such frequent attendance. There were also wide variations by field among department heads who endorsed relatively infrequent attendance of senior faculty. In electrical engineering 22 percent of the department heads thought that attendance not more than once very four years was adequate. In the field of physics the comparable proportion was less than 5 percent.

Fig. 6. Percentage Distribution of Selected Department Heads' Opinions of Optimal Frequency of International Travel



Professional Benefits

Opinions were also solicited about the chief professional benefits to be derived from attending international scientific meetings (figure 7, table 5). Of the six benefits listed in the questionnaire and summarized in figure 7, department heads indicated that two were predominant: first, more complete and timely acquisition of scientific and technical information than is otherwise possible (43 percent), and second, stimulating innovation and new lines of investigation for faculty members (36 percent). The third-ranked benefit, which was endorsed as most important by one out of ten department heads, was that participation contributes to the professional reputation of the attending faculty member. Interestingly, only 1 percent of the department heads indicated that improvement in the quality of faculty teaching was the chief benefit of participation.

In summary, department heads viewed the benefits to be primarily informational and stimulative in nature. Fewer than 1 percent indicated that they could see no important professional benefits to faculty from international scientific meetings.

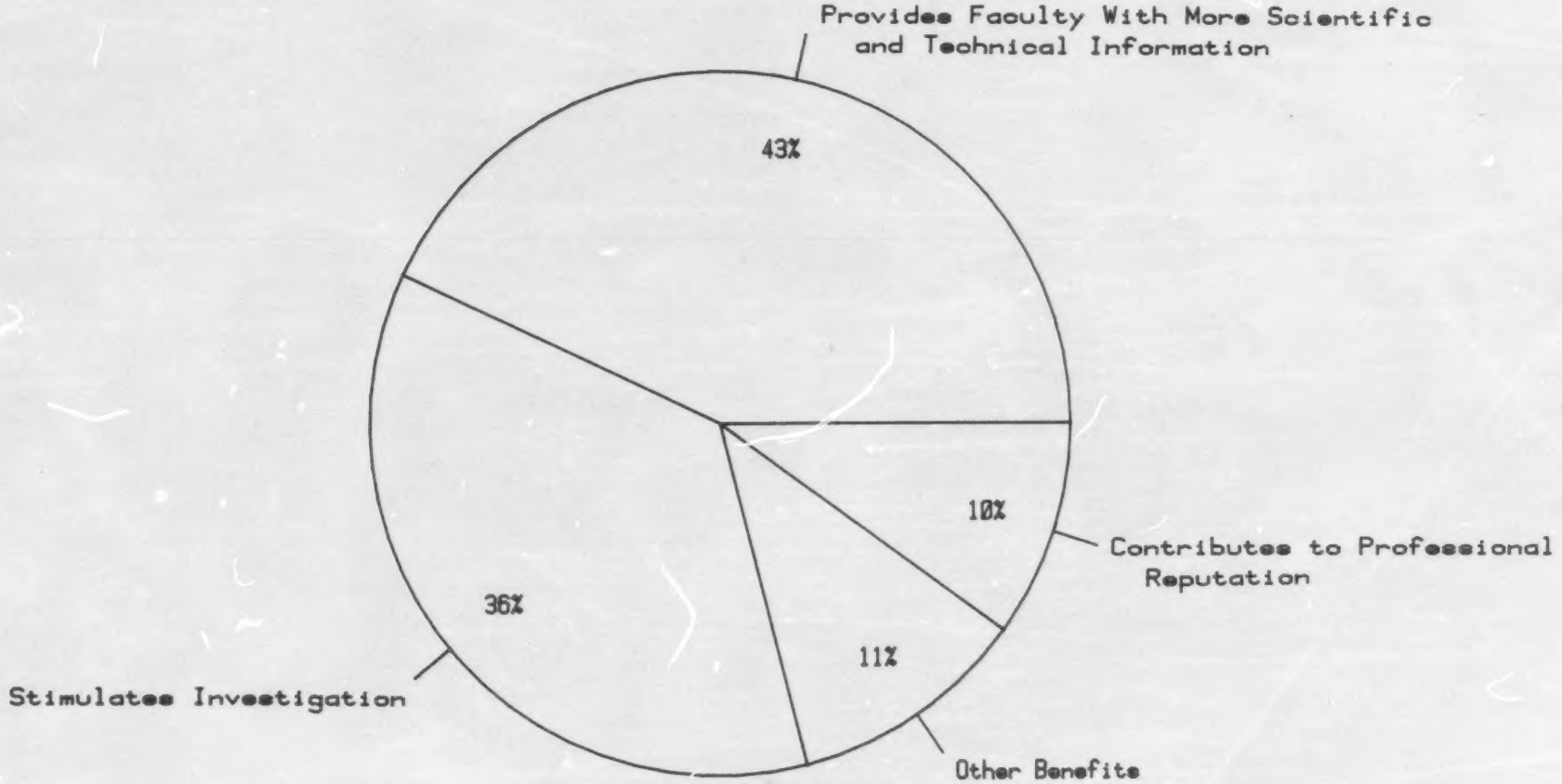
Meeting Format

Department heads were also asked to express their views of the kind of meeting format which was generally the most productive at international scientific meetings. Of the three formats listed in the questionnaire they tended to choose one that was moderately structured (table 6).

Only 8 percent preferred the highly structured program consisting primarily of invited papers, usually by well established scientists. At the other extreme, relatively few (15 percent) endorsed an unstructured type of program which would consist mainly of short presentations by all or most attendees and interactive discussion, with few if any formal papers presented. Rather, the preponderant majority (77 percent) endorsed as most productive a program consisting of a combination of invited and contributed papers.

Fig. 7. Percentage Distribution of Selected Department Heads' Opinions About the Chief Professional Benefit of International Travel

All Universities, 1979-80



BASIC REPORT TABLES

Survey Population

Departments	All Universities (N=184)		Public Universities (N=112)		Private Universities (N=72)	
	N	%	N	%	N	%
Biology	183	100.0	111	60.6	72	39.4
Chemistry	182	100.0	112	61.5	70	38.5
Electrical Engineering	135	100.0	94	69.6	41	30.4
Mathematics	184	100.0	112	60.9	72	39.1
Mechanical Engineering	136	100.0	94	69.1	42	30.9
Physics	182	100.0	112	61.5	70	38.5
Total	1,002	100.0	635	63.4	367	36.6

Table 1

Full-Time Faculty at Selected Science and Engineering Departments and Travel to International Scientific Meetings Held Abroad, 1979-80

TOTAL UNIVERSITIES (N=184)

Department	Full-Time Faculty (A) Total N	Total %	Junior %	Senior %	Number of Person-Trips (B) Total N	Total %	Junior %	Senior %	Person-Trips per 100 Faculty (B/A) Junior	Senior
Biology	4,329	100.0	27.7	72.3	947	100.0	21.5	78.5	17	24
Chemistry	3,958	100.0	21.2	78.8	918	100.0	10.8	89.2	12	26
Electrical engineering	2,950	100.0	24.0	76.0	774	100.0	14.9	85.1	16	29
Mathematics	5,685	100.0	28.5	71.5	861	100.0	20.7	79.3	11	17
Mechanical engineering	2,494	100.0	24.1	75.9	439	100.0	9.6	90.4	7	21
Physics	3,845	100.0	16.7	83.3	881	100.0	11.8	88.2	16	24
Total	23,262	100.0	24.1	75.9	4,819	100.0	15.4	84.6	13	23

PUBLIC UNIVERSITIES (N=112)

Department	Full-Time Faculty (A) Total N	Total %	Junior %	Senior %	Number of Person-Trips (B) Total N	Total %	Junior %	Senior %	Person-Trips per 100 Faculty (B/A) Junior	Senior
Biology	2,964	100.0	27.3	72.7	564	100.0	22.9	77.1	16	20
Chemistry	2,762	100.0	20.6	79.4	637	100.0	10.5	89.5	12	26
Electrical engineering	2,008	100.0	23.4	76.6	479	100.0	12.5	87.5	13	27
Mathematics	4,142	100.0	27.1	72.9	532	100.0	18.9	81.1	9	14
Mechanical engineering	1,795	100.0	26.2	73.8	261	100.0	11.9	88.1	7	17
Physics	2,530	100.0	15.0	85.0	582	100.0	9.8	90.2	15	24
Total	16,201	100.0	23.6	76.4	3,055	100.0	14.6	85.4	12	21

PRIVATE UNIVERSITIES (N=72)

Department	Full-Time Faculty (A) Total N	Total %	Junior %	Senior %	Number of Person-Trips (B) Total N	Total %	Junior %	Senior %	Person-Trips per 100 Faculty (B/A) Junior	Senior
Biology	1,365	100.0	28.6	71.4	383	100.0	19.6	80.4	19	32
Chemistry	1,196	100.0	22.5	77.5	281	100.0	11.1	88.9	12	27
Electrical engineering	943	100.0	25.3	74.7	295	100.0	18.6	81.4	23	34
Mathematics	1,543	100.0	32.4	67.6	329	100.0	23.7	76.3	16	24
Mechanical engineering	699	100.0	18.9	81.1	177	100.0	6.2	93.8	8	29
Physics	1,315	100.0	19.9	80.1	299	100.0	16.1	83.9	18	24
Total	7,061	100.0	25.4	74.6	1,764	100.0	16.9	83.1	17	28

Table 2

Average Amount and Source of Funds for Travel to International Scientific Meetings Held Abroad at Selected Science and Engineering Departments, 1979-80

TOTAL UNIVERSITIES (N=184)

Travel Funds	Total	Biology	Chemistry	Electrical Engineering	Mathematics	Mechanical Engineering	Physics
Average amount	$5,776	5,279	6,732	8,007	4,483	4,335	6,047
Percentage distribution of sources:							
Federal funds	48.9	44.4	49.5	52.2	34.1	47.9	59.8
Institutional funds	17.2	18.0	14.3	18.6	20.1	16.6	16.8
Personal funds	11.5	13.5	10.8	5.7	27.4	9.4	6.1
Other	22.3	24.1	25.4	23.5	18.4	26.1	17.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

PUBLIC UNIVERSITIES (N=112)

Travel Funds	Total	Biology	Chemistry	Electrical Engineering	Mathematics	Mechanical Engineering	Physics
Average amount	$5,875	4,788	7,982	6,442	5,430	3,808	6,571
Percentage distribution of sources:							
Federal funds	47.0	40.5	51.1	53.2	28.8	39.4	58.7
Institutional funds	20.0	23.2	15.7	20.8	22.8	21.9	19.1
Personal funds	13.2	16.0	10.6	6.1	33.0	10.5	6.2
Other	19.8	20.3	22.6	19.9	15.4	28.2	16.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

PRIVATE UNIVERSITIES (N=72)

Travel Funds	Total	Biology	Chemistry	Electrical Engineering	Mathematics	Mechanical Engineering	Physics
Average amount	$5,596	6,036	4,731	11,592	3,011	5,515	5,210
Percentage distribution of sources:							
Federal funds	52.5	49.2	44.9	51.0	48.5	61.0	62.2
Institutional funds	12.2	11.7	10.6	15.7	12.5	8.5	11.7
Personal funds	8.5	10.3	11.5	5.2	12.3	7.7	6.0
Other	26.8	28.8	33.0	28.1	26.7	22.8	20.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 3

Percentage Distribution of Selected Department Heads' Opinions of Federal Funding in Their Own Disciplines for Travel to International Scientific Meetings Held Abroad, 1979-80

TOTAL UNIVERSITIES (*N*=184)

Adequacy of Federal Funding	Total	Biology	Chemistry	Electrical Engineering	Mathematics	Mechanical Engineering	Physics
The level of federal support for such international travel is too high; some travel funds should be reallocated to research.	2.4	3.5	2.2	4.4	1.8	2.0	1.2
The current level of federal funds for such international travel is adequate, but more opportunities should be given to *established* scientists to participate.	6.0	7.3	3.8	6.6	4.4	9.7	5.2
The current level of federal funds for such international travel is adequate, but more opportunities should be given to *younger* scientists to participate.	23.9	23.7	30.2	24.8	22.0	24.1	18.7
On the whole, both the level of federal funds for such international travel and the mix of established and younger scientists are adequate.	27.1	26.1	25.1	26.5	26.2	27.5	31.0
The level of support for such international travel is so inadequate that more federal funds should be made available even if at the expense of research funds.	20.0	19.5	24.8	19.3	19.2	18.2	18.3
Other	16.5	17.7	11.2	13.0	23.1	12.8	19.1
Do not know	4.2	2.2	2.8	5.4	3.2	5.6	6.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

PUBLIC UNIVERSITIES (N=112)

Adequacy of Federal Funding	Total	Biology	Chemistry	Electrical Engineering	Mathematics	Mechanical Engineering	Physics
The level of federal support for such international travel is too high; some travel funds should be reallocated to research.	2.6	2.1	1.0	6.3	3.0	1.3	2.0
The current level of federal funds for such international travel is adequate, but more opportunities should be given to *established* scientists to participate.	6.6	8.5	5.0	5.1	5.9	9.2	5.9
The current level of federal funds for such international travel is adequate, but more opportunities should be given to *younger* scientists to participate.	22.9	23.4	29.0	24.1	19.8	23.7	17.8
On the whole, both the level of federal funds for such international travel and the mix of established and younger scientists are adequate.	28.9	29.8	27.0	27.8	26.7	30.3	31.7
The level of support for such international travel is so inadequate that more federal funds should be made available even if at the expense of research funds.	22.6	20.2	29.0	19.0	22.8	18.4	24.8
Other	13.0	16.0	7.0	11.4	17.8	10.5	14.9
Do not know	3.5	0	2.0	6.3	4.0	6.6	3.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 3 (Cont'd.)

Percentage Distribution of Selected Department Heads' Opinions of Federal Funding in Their Own Disciplines for Travel to International Scientific Meetings Held Abroad, 1979-80
PRIVATE UNIVERSITIES (N=72)

Adequacy of Federal Funding	Total	Biology	Chemistry	Electrical Engineering	Mathematics	Mechanical Engineering	Physics
The level of federal support for such international travel is too high; some travel funds should be reallocated to research.	2.3	5.6	4.0	0	0	3.6	0
The current level of federal funds for such international travel is adequate, but more opportunities should be given to *established* scientists to participate.	5.0	5.6	2.0	10.0	2.0	10.7	4.0
The current level of federal funds for such international travel is adequate, but more opportunities should be given to *younger* scientists to participate.	25.5	24.1	32.0	26.7	25.5	25.0	20.0
On the whole, both the level of federal funds for such international travel and the mix of established and younger scientists are adequate.	24.0	20.4	22.0	23.3	25.5	21.4	30.0
The level of support for such international travel is so inadequate that more federal funds should be made available even if at the expense of research funds.	15.6	18.5	18.0	20.0	13.7	17.9	8.0
Other	22.4	20.4	18.0	16.7	31.4	17.9	26.0
Do not know	5.3	5.6	4.0	3.3	2.0	3.6	12.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 4

Percentage Distribution of Selected Department Heads' Opinions Regarding the Optimal Frequency of Travel by Full-Time Faculty in Their Departments to International Scientific Meetings Held Abroad
TOTAL UNIVERSITIES (N=184)

Optimal Frequency	Total	Biology	Chemistry	Electrical Engineering	Mathematics	Mechanical Engineering	Physics
Junior Faculty							
More than once a year	2.9	4.2	2.6	6.7	1.8	0	2.6
Once a year	17.0	17.0	19.8	10.0	17.8	12.8	21.9
Once every two years	35.7	31.3	39.2	33.5	34.6	32.5	41.4
Once every three years	25.4	30.4	22.8	22.7	23.7	27.3	25.6
Once every four years	7.3	8.6	6.8	8.2	6.2	11.5	3.8
Once every five years	5.9	5.2	5.4	8.9	6.2	9.3	2.0
Less than once every five years	5.7	3.3	3.4	10.0	9.7	6.6	2.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Senior Faculty							
More than once a year	5.2	5.5	7.2	7.6	1.8	6.9	3.4
Once a year	26.0	27.1	31.5	26.3	18.1	20.6	30.9
Once every two years	37.4	33.0	39.4	31.4	39.3	38.3	41.9
Once every three years	18.1	25.2	11.5	13.1	19.6	19.0	19.1
Once every four years	6.8	5.9	6.2	7.9	10.8	6.8	3.5
Once every five years	5.0	2.7	2.2	12.7	7.1	7.5	.6
Less than once every five years	1.4	.6	2.0	.9	3.3	.9	.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 4 (Cont'd.)

Percentage Distribution of Selected Department Heads' Opinions Regarding the Optimal Frequency of Travel by Full-Time Faculty in Their Departments to International Scientific Meetings Held Abroad

PUBLIC UNIVERSITIES (N=112)

Optimal Frequency	Total	Biology	Chemistry	Electrical Engineering	Mathematics	Mechanical Engineering	Physics
Junior Faculty							
More than once a year	2.5	2.1	3.0	3.8	3.0	0	3.0
Once a year	16.7	16.0	21.0	11.4	17.8	10.5	21.8
Once every two years	34.9	28.7	40.0	38.0	31.7	26.3	43.6
Once every three years	24.4	30.9	22.0	15.2	23.8	31.6	22.8
Once every four years	7.6	10.6	6.0	8.9	4.0	11.8	[illegible]
Once every five years	7.5	7.4	5.0	11.4	8.9	11.8	2.0
Less than once every five years	6.4	4.3	3.0	11.4	10.9	7.9	2.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Senior Faculty							
More than once a year	4.7	4.3	8.0	5.1	3.0	5.3	3.0
Once a year	25.2	25.5	30.0	29.1	15.8	17.1	32.7
Once every two years	38.4	35.1	44.0	29.1	40.6	39.5	40.6
Once every three years	17.4	22.3	10.0	10.1	20.8	21.1	19.8
Once every four years	7.0	8.5	5.0	11.4	8.9	6.6	2.0
Once every five years	5.7	3.2	1.0	13.9	7.9	9.2	1.0
Less than once every five years	1.6	1.1	2.0	1.3	3.0	1.3	1.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

PRIVATE UNIVERSITIES (N=72)

Optimal Frequency	Total	Biology	Chemistry	Electrical Engineering	Mathematics	Mechanical Engineering	Physics
Junior Faculty							
More than once a year	3.7	7.4	2.0	13.3	0	0	2.0
Once a year	17.5	18.5	18.0	6.7	17.6	17.9	22.0
Once every two years	37.0	35.2	38.0	23.3	39.2	46.4	38.0
Once every three years	27.2	29.6	24.0	40.0	23.5	17.9	30.0
Once every four years	6.9	5.6	8.0	6.7	9.8	10.7	2.0
Once every five years	3.1	1.9	6.0	3.3	2.0	3.6	2.0
Less than once every five years	4.6	1.9	4.0	6.7	7.8	3.6	4.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Senior Faculty							
More than once a year	6.1	7.4	6.0	13.3	0	10.7	4.0
Once a year	27.4	29.6	34.0	20.0	21.6	28.6	28.0
Once every two years	35.8	29.6	32.0	36.7	37.3	35.7	44.0
Once every three years	19.2	29.6	14.0	20.0	17.6	14.3	18.0
Once every four years	6.5	1.9	8.0	0	13.7	7.1	6.0
Once every five years	3.8	1.9	4.0	10.0	5.9	3.6	0
Less than once every five years	1.2	0	2.0	0	3.9	0	0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 5

Percentage Distribution of Opinions of Selected Department Heads About the Most Important Professional Benefit of Travel to International Scientific Meetings Held Abroad, 1979-80

TOTAL UNIVERSITIES (N=184)

Chief Benefit	Total	Biology	Chemistry	Electrical Engineering	Mathematics	Mechanical Engineering	Physics
Provides faculty with more complete and timely acquisition of scientific and technical information than is otherwise possible.	43.4	44.8	46.7	44.6	45.0	37.3	40.3
Stimulates innovation and new lines of investigation for faculty members.	36.2	31.0	35.2	27.7	35.1	45.3	42.6
Advances faculty research projects, resulting in more rapid publication of results.	2.7	2.6	.8	3.6	3.6	2.7	3.1
Improves the quality of faculty teaching.	.9	.9	1.6	1.2	.9	0	.8
Contributes to more rapid professional advancement of faculty members.	2.4	1.7	0	4.8	2.7	4.0	2.3
Contributes fo professional reputation of faculty.	9.6	13.8	9.8	14.5	7.2	6.7	6.2
There are no important professional benefits to faculty from international scientific meetings.	.8	.9	.8	2.4	0	1.3	0
Other	4.1	4.3	4.9	1.2	5.4	2.7	4.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

PUBLIC UNIVERSITIES (N=112)

Chief Benefit	Total	Biology	Chemistry	Electrical Engineering	Mathematics	Mechanical Engineering	Physics
Provides faculty with more complete and timely acquisition of scientific and technical information than is otherwise possible.	42.1	42.7	45.1	39.3	50.0	33.9	39.8
Stimulates innovation and new lines of investigation for faculty members.	36.6	36.0	35.4	29.5	30.6	50.8	38.6
Advances faculty research projects, resulting in more rapid publication of results.	3.0	2.7	1.2	3.3	2.8	3.4	4.5
Improves the quality of faculty teaching.	.9	0	1.2	1.6	1.4	0	1.1
Contributes to more rapid professional advancement of faculty members.	2.7	2.7	0	4.9	4.2	3.4	2.3
Contributes fo professional reputation of faculty.	10.3	13.3	11.0	18.0	6.9	5.1	8.0
There are no important professional benefits to faculty from international scientific meetings.	1.1	1.3	1.2	3.3	0	1.7	0
Other	3.2	1.3	4.9	0	4.2	1.7	5.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 5 (Cont'd.)

Percentage Distribution of Opinions of Selected Department Heads About the Most Important Professional Benefit of Travel to International Scientific Meetings Held Abroad, 1979-80
PRIVATE UNIVERSITIES (N=72)

Chief Benefit	Total	Biology	Chemistry	Electrical Engineering	Mathematics	Mechanical Engineering	Physics
Provides faculty with more complete and timely acquisition of scientific and technical information than is otherwise possible.	46.2	48.8	50.0	59..	35.9	50.0	41.5
Stimulates innovation and new lines of investigation for faculty members.	35.2	22.0	35.0	22.7	43.6	25.0	51.2
Advances faculty research projects, resulting in more rapid publication of results.	2.0	2.4	0	4.5	5.1	0	0
Improves the quality of faculty teaching.	1.0	2.4	2.5	0	0	0	0
Contributes to more rapid professional advancement of faculty members.	1.5	0	0	4.5	0	6.3	2.4
Contributes fo professional reputation of faculty.	8.0	14.6	7.5	4.5	7.7	12.5	2.4
There are no important professional benefits to faculty from international scientific meetings.	0	0	0	0	0	0	0
Other	6.0	9.8	5.0	4.5	7.7	6.3	2.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 6

Percentage Distribution of Selected Department Heads' Opinions of the Most Productive Format for International Scientific Meetings, 1979-80

TOTAL UNIVERSITIES (N=184)

Most Productive Format	Total	Biology	Chemistry	Electrical Engineering	Mathematics	Mechanical Engineering	Physics
Program consisting primarily of invited papers	8.1	11.0	4.9	7.3	10.1	2.7	11.0
Program consisting of invited and contributed papers	77.1	72.5	78.9	80.8	71.2	79.4	81.8
Program consisting primarily of short presentations by attendees and of interactive discussion	14.7	16.5	16.2	11.9	18.7	17.9	7.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

PUBLIC UNIVERSITIES (N=112)

Most Productive Format	Total	Biology	Chemistry	Electrical Engineering	Mathematics	Mechanical Engineering	Physics
Program consisting primarily of invited papers	8.5	10.6	3.0	7.6	12.9	3.9	12.9
Program consisting of invited and contributed papers	77.9	74.5	82.0	79.7	70.3	82.9	79.2
Program consisting primarily of short presentations by attendees and of interactive discussion	13.4	14.9	15.0	12.7	16.8	13.2	7.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

PRIVATE UNIVERSITIES (N=72)

Most Productive Format	Total	Biology	Chemistry	Electrical Engineering	Mathematics	Mechanical Engineering	Physics
Program consisting primarily of invited papers	7.1	11.3	8.0	6.7	5.9	0	8.0
Program consisting of invited and contributed papers	76.0	69.0	74.0	83.3	72.5	71.4	86.0
Program consisting primarily of short presentations by attendees and of interactive discussion	16.9	18.3	18.0	10.0	21.6	28.6	6.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

APPENDIX A: Survey Instrument

AMERICAN COUNCIL ON EDUCATION
ONE DUPONT CIRCLE
WASHINGTON, D. C. 20036

HIGHER EDUCATION PANEL
(202) 833-4757

May 2, 1980

Dear Department Head:

This is the fiftieth Higher Education Panel Survey, "Travel to International Scientific Meetings, 1979-80." Sponsored by the National Science Foundation, the survey is addressed to the heads of selected science and engineering departments and seeks their views on faculty travel to international scientific meetings.

NSF is an important source of funds for travel to international scientific meetings by academic scientists and engineers. Some of the support is made available through NSF's International Travel Grant (ITG) Program. The survey will help determine the ways in which the ITG Program might be restructured to better meet the needs of academic scientists and engineers. Your opinions about the current extent of participation in international meetings, the benefits of travel to these meetings, and other factors are intended to assist NSF in planning the policies, scope, and level of the ITG Program.

Please understand that your responses will be held in strictest confidence. As with all our surveys, the data you provide will be reported in summary fashion only and will not be identifiable with your institution. This survey is authorized by the National Science Foundation Act of 1950, as amended. While you are not required to respond, your cooperation is needed to make the results comprehensive, reliable, and timely.

If at all possible please return the completed questionnaire to the HEP representative on your campus in time for forwarding to us by May 23, 1980. Please do not hesitate to telephone us collect at (202)833-4757 if you have any problems or questions about the survey.

Thank you for your assistance and cooperation.

Sincerely,

Frank J. Atelsek

Frank J. Atelsek
Panel Director

Survey Coverage

A questionnaire should be completed by the department head in each of the following departments.

Biology	Mathematics	Electrical Engineering
Chemistry	Physics	Mechanical Engineering

If there is no biology department at your institution, then the botany or zoology department--whichever is larger--should respond. If there is neither a biology nor a botany nor a zoology department, then the largest department concerned with life sciences should respond. Exclude all departments in your medical school. If there is no separate department of physics, a combined department of physics and astronomy is to be considered a physics department for the purposes of this survey.

Definitions

1979-80:

You should use the current fiscal year and include summer 1979.

International scientific meetings held abroad:

Includes meetings of scientists or engineers held outside the United States (but not in either Canada or Mexico) for the purpose of communicating and exchanging scientific and technical information. For example, a NATO Advanced Study Institute held abroad is considered an international scientific meeting.

Exclude visits to foreign scientific institutions, sabbaticals spent at foreign institutions, or research conducted abroad.

Person-trips:

If one person made two trips, this amounts to two person-trips. If two people made one trip each, this also counts as two person-trips. If one person made one trip but attended two meetings, this counts as one person-trip.

Full-time faculty:

Includes all regular full-time faculty assigned to your department, including instructors and assistant professors. Please include nontenure-track personnel who have faculty status. Please do not include visiting professors, post-doctorates, research associates, graduate students, or others who are not regular full-time members of your departmental faculty. Be sure to include yourself.

If any full-time faculty who serve half-time in your department also serve half-time in one of the other departments covered in this survey, please confer with the head of the other department to decide who will provide the information about those faculty. The reporting department should provide information as if the individuals were assigned solely to that department. Do not include any regular faculty serving less than half-time in your department. Faculty employed part-time at your institution should also be excluded.

Junior faculty:

Instructors and assistant professors

Senior faculty:

Associate and full professors

BE SURE TO INCLUDE
NONTENURE-TRACK PERSONNEL
WHO HAVE FACULTY STATUS

Expenses:

In your estimate include only transporation costs, meeting registration fees, and per diem expenses.

OMB No. 099-R0265
Exp. 6/81

American Council on Education
Higher Education Panel Survey No. 50:

Travel to International Scientific Meetings, 1979-80

Department_____

1. For fiscal 1979-80 (including summer 1979), please report (a) the number of full-time faculty in your department and (b) the total number of person-trips made by these faculty to international scientific meetings held abroad:

PLEASE READ THE DEFINITIONS CAREFULLY BEFORE COMPLETING THE QUESTIONNAIRE.

Number of full-time:
junior faculty members_____
senior faculty members_____

Number of person-trips made by:
junior faculty members_____
senior faculty members_____

2. Taking into consideration *both* the overall welfare of your department *and* the professional welfare of individual full-time faculty in your department, how often do you think full-time faculty should travel to international scientific meetings?

(Check one in each column)

	Optimal Frequency	
	Junior Faculty	Senior Faculty
More than once a year	( )	( )
Once a year	( )	( )
Once every two years	( )	( )
Once every three years	( )	( )
Once every four years	( )	( )
Once every five years	( )	( )
Less than once every five years	( )	( )

3. Which one of the following statements best expresses your assessment of the extent of participation of academic scientists in *your discipline* in international scientific meetings held abroad? Please check only one.

( ) The level of federal support for such international travel is too high; some travel funds should be reallocated to research.

( ) The current level of federal funds for such international travel is adequate, but more opportunities should be given to *established* scientists to participate.

( ) The current level of federal funds for such international travel is adequate, but more opportunities should be given to *younger* scientists to participate.

( ) On the whole, both the level of federal funds for such international travel and the mix of established and younger scientists are adequate.

( ) The level of support for such international travel is so inadequate that more federal funds should be made available even if at the expense of research funds.

( ) Other *(please specify)*_____

_____

4. Of the following statements, which three do you consider the most vital or important professional benefits to full-time faculty from travel to international scientific meetings? Please rank order three benefits only.

   ( ) Provides faculty with more complete and timely acquisition of scientific and technical information than is otherwise possible.

   ( ) Stimulates innovation and new lines of investigation for faculty members.

   ( ) Advances faculty research projects, resulting in more rapid publication of results.

   ( ) Improves the quality of faculty teaching.

   ( ) Contributes to more rapid professional advancement of faculty members.

   ( ) Contributes to professional reputation of faculty.

   ( ) There are no important professional benefits to faculty from international scientific meetings.

   ( ) Other *(please specify)* _____

   _____

5. Taking into consideration your response to question 4, which one of the three formats listed below do you think is generally the most productive?

   ( ) Program consisting primarily of invited papers, usually by well-established scientists.

   ( ) Program consisting of invited and contributed papers.

   ( ) Program consisting mainly of short presentations by all or most attendees and interactive discussion; no or few formal papers presented.

6. For fiscal 1979-80 (including summer 1979), please *approximate* (a) the total expenditures by full-time faculty in your department (including yourself) for travel to international scientific meetings abroad and (b) the sources of these funds in terms of a percentage of the total.

   a. Total travel expenses $_____

   b. Distribution by source:

Federal funds	_____ %
University/college funds	_____ %
Personal funds	_____ %
Other funds	_____ %
	100 %

Thank you for your assistance.

Please return this form by May 23, 1980.

Higher Education Panel
American Council on Education
One Dupont Circle, N.W.
Washington, D.C. 20036

Please keep a copy of this survey for your records.

Person completing form

Name _____

Dept. _____

Phone _____

If you have any questions or problems, please call the HEP staff collect at 202-833-4757.

Appendix B: Stratification Design and Response Analysis

The population of eligible universities was stratified into 12 cells, which accounted for each applicable department separately at public and private universities. Survey responses from Panel institutions were weighted by the ratio of the number of departments in the population to the number of departments in the Panel that responded to the survey.

Missing values on a questionnaire were replaced by the mean value reported for the item within the appropriate stratification cell.

Table B-1

Stratification Design for Weighting

Cell		Population (N=1,002)	Panel Respondents (N=814)
Public:	biology	111	94
	chemistry	112	100
	mathematics	112	101
	physics	112	101
	electrical engineering	94	79
	mechanical engineering	94	76
Private:	biology	72	54
	chemistry	70	50
	mathematics	72	51
	physics	70	50
	electrical engineering	41	30
	mechanical engineering	42	28

Usable responses were received from 93 percent of the 179 universities and 84 percent of the 974 departments included in the survey. Relatively high response rates were recorded for public institutions (98 percent) and institutions with total FTE enrollments of 10,000 or more (97 percent). (See table B-2).

Lower-than-average response rates were recorded for institutions with fewer than 5,000 FTE students (68 percent) and fewer than 200 FTE graduate students (80 percent).

Table B-2

Comparison of Institutional Respondents and Nonrespondents

Characteristic	Respondents (N=166)	Nonrespondents (N=13)	Response Rate
Total	100.0	100.0	92.7
Control			
Public	65.1	15.4	98.2
Private	34.9	84.6	84.1
Region			
East	25.3	23.1	93.3
Midwest	26.5	23.1	93.6
South	29.5	23.1	94.2
West	18.7	30.7	88.6
Graduate FTE enrollment 1976			
Less than 200	4.8	15.4	80.0
200-999	37.3	53.8	89.9
1,000-2,999	44.0	23.1	96.1
3,000 or more	13.9	7.7	95.8
Total FTE enrollment 1976			
Less than 5,000	10.2	61.5	68.0
5,000-9,999	31.3	15.4	96.3
10,000-19,999	38.6	15.4	97.0
20,000 or more	19.9	7.7	97.1

No estimates of sampling error were computed since the class of institutions included in this survey--universities--did not constitute a sample. All universities in the population had been invited to participate in the Panel. Of the 184 eligible universities in the population, 97 percent were members of the Panel.

Other Reports of the Higher Education Panel
American Council on Education

El-Khawas, E. H. and Kinzer, J. L. **The Impact of Office of Education Student Assistance Programs, Fall 1973.** Higher Education Panel Report, No. 18, April, 1974.

El-Khawas, E. H. and Kinzer, J. L. **Enrollment of Minority Graduate Students at Ph.D. Granting Institutions.** Higher Education Panel Report, No. 19, August, 1974.

El-Khawas, E. H. **College and University Facilities: Expectations of Space and Maintenance Needs for Fall 1974.** Higher Education Panel Report, No. 20, September, 1974.

Kinzer, J. L. and El-Khawas, E. H. **Compensation Practices for Graduate Research Assistants: A Survey of Selected Doctoral Institutions.** Higher Education Panel Report, No. 21, October, 1974.

El-Khawas, E. H. and Furniss, W. T. **Faculty Tenure and Contract Systems: 1972 and 1974.** Higher Education Panel Report, No. 22, December, 1974.

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Atelsek, Frank J. and Gomberg, Irene L. **Bachelor's Degrees Awarded to Minority Students, 1973-74.** Higher Education Panel Report, No. 24, January, 1977.

Atelsek, Frank J. and Gomberg, Irene L. **Nonfederal Funding of Biomedical Research and Development: A Survey of Doctoral Institutions.** Higher Education Panel Report, No. 25, July, 1975.

Gomberg, Irene L. and Atelsek, Frank J. **Major Field Enrollment of Junior-Year Students, 1973 and 1974.** Higher Education Panel Report, No. 26, April, 1976.

Atelsek, Frank J. and Gomberg, Irene L. **Student Assistance: Participants and Programs, 1974-75.** Higher Education Panel Report, No. 27, July, 1975.

Atelsek, Frank J. and Gomberg, Irene L. **Health Research Facilities: A Survey of Doctorate-Granting Institutions.** Higher Education Panel Report, No. 28, February, 1976.

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Atelsek, Frank J. and Gomberg, Irene L. **Young Doctorate Faculty in Selected Science and Engineering Departments, 1975 to 1980.** Higher Education Panel Report, No. 30, August, 1976.

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Atelsek, Frank J. and Gomberg, Irene L. **Foreign Area Research Support Within Organized Research Centers at Selected Universities, FY 1972 and 1976.** Higher Education Panel Report, No. 32, December, 1976.

Atelsek, Frank J. and Gomberg, Irene L. **College and University Services for Older Adults.** Higher Education Panel Report, No. 33, February, 1977.

Atelsek, Frank J. and Gomberg, Irene L. **Production of Doctorates in the Biosciences, 1975-1980: An Experimental Forecast.** Higher Education Panel Report, No. 34, November 1977.

Gomberg, Irene L. and Atelsek, Frank J. **Composition of College and University Governing Boards.** Higher Education Panel Report, No. 35, August, 1977.

Atelsek, Frank J. and Gomberg, Irene L. **Estimated Number of Student Aid Recipients, 1976-77.** Higher Education Panel Report, No. 36, September, 1977.

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